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Search History

Set#	Query
L1	(analyzer or device or apparatus or instrument) near10 (contamination or spoilation or contagion or impurity)
L2	(analyzer or device or apparatus or instrument) near5 (contamination or spoilation or contagion or impurity)
L3	L2 and (customer or client or buyer)
L4	L2 and verif\$8
L5	(analyzer or device or apparatus or instrument) near10 (contamination or spoilation or contagion or impurity) near10 (verif\$8 or valid\$4 or check\$3)
L6	L1 and L2 and L3 and L4 and L5

Recycling update: make way for more custom systems. (plastics recycling) (Industry News: Recycling)

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Recycling update: make way for more custom systems. (plastics recycling) (Industry News: Recycling)

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Have resin companies stopped buying big turnkey recycling systems? It looks that way. Three such deals are off or on hold. Occidental Chemical Corp. has delayed plans for a 40-million-lb/yr plant in Texas, pending better business conditions. Quantum Chemical Corp. has delayed plans to build more regional recycling plants besides its Heath, Ohio, plant. And Dow Chemical Co. called off plans to put a big recycling line in at waste hauler CR&R Inc. in Stanton, Calif., which was to supply recycled resins to Dow.

There are still some large turnkey installations going in, like a 10-million-lb/yr line from Italian recycling machine builder Sorema SRL that started up in January at Mobil Chemical Co.'s plant in Jacksonville, Ill., and a line from John Brown Inc., Providence, R.I., on order for delivery late this year to recycler Envirothene Inc. in Chino, Calif. But more new recycling projects tend to be customized machinery built for independent recyclers, like \$3.5 million of recycling equipment, engineered by an independent consultant for the separation of all six resin types. This equipment is soon to be installed at Consourse Plastic Recycling Corp. in Tampa, Fla. (see PT, July '92, p. 99). Another new custom system installed at Polymer Resource Group, Baltimore (a joint venture of ITC Inc. and Himont Incorporated). Polysource is starting up two 10-million-lb/yr lines this month.

Other custom recycling lines have been recently sold by Sterling Systems Inc., Forest, Va. After years of building custom air-conveying systems for recyclers and fixing existing recycling lines, Sterling is now custom designing whole systems, tackling not just bottles but a wide variety of materials, including carpet. Sterling's biggest complete washing and recycling system was installed in March at Envipco in Riverside, Calif., to separate more than 3000 lb/hr of PET and HDPE basecup flake from bottles ground in Envipco's reverse vending machines.

Sterling also built several recent dry systems to grind and separate carpet fiber (see PT, April '93, p. 22) and a custom 24-million-lb/yr line now at Nova Group in Boca Raton, Fla., to recycle PP and PS plastic-and-metal hangers. Large recycling lines are also still being ordered by independent recyclers, despite the price woes of recycled resins. Nova, for instance, already has expansion plans.

Several sellers of complete turnkey recycling systems are responding to this move to customization by reorganizing. John Brown, for instance, downsized its recycling group at year end and moved it to the Cumberland div. Herbold GmbH/Refakt GmbH, a German turnkey system maker, disappointed at recent turnkey sales, sacked its Sutton, Mass., sales force and hired new people at the end of the year.

**DIFFERENT PHILOSOPHY OF WASHING**

What all these recent custom installations have in common is their approach to washing. For starters, they don't wash flake in single vessels. Instead, these installations all use some form of a continuous-loop washing system, where washing is done over a series of tanks or tubes.

The standard single-vessel approach involves washing a batch of flakes by agitation and assumes that flake stays in the tank for a certain amount of time. Instead, Sterling offers a "throughput-agitation washer that washes as it propels materials through the system," says Sterling's Goldman. "It's vertical--down, up, down, up--and snakes through chambers."

Sterling thinks it is the only commercial builder of recycling

machinery to take this linear washing approach, though several proprietary lines also use it, like the one running at APR Plastic Processing Inc. in East Farmingdale, N.Y., which started up in mid-1992 to grind and wash PET flake; the one at Nicon Plastics Inc., a large-volume PET recycler in Long Island City, N.Y., that also makes PET sheet;

and one at East Coast Recycling Assoc. (formerly Wheaton Plastic Recycling) in Millville, N.J., a recent management buyout from Wheaton Industries. (Not exactly by coincidence, Sterling's marketing v.p. Harold Goldman is a past president of Nicon and consulted on the engineering of Wheaton's line long ago.)

Continuous washing can take anywhere from 20 min to 2 hr. Sterling and Nicon say their flake travels about 20 min, which they can verify when they switch processing from clear PET to green PET by seeing how long it takes for green flake to come out the other end. A Polysource engineer estimates that in its system, flake spends 1.5 hr from the time it's ground until it becomes a pellet, while an APR engineer estimates its flake travels for two hours.

Polysource has run a pilot 3-million-lb/yr line for three years to develop a continuous multi-chamber washing line for processing HDPE, PET and PP bottles and rigid containers. Polysource granulates bottles and removes loose paper labels by suction with two air cyclones and a bag filter. Flake then goes to an elutriator. Then it gets wet, going through two hydrocyclones from AKW Apparate & Verfahren GmbH in Germany. (AKW was a development partner with ITC in the original Polysource venture). The line is unusual in that it has no sink/float tank. Hydrocyclone separation of PET from HDPE is the only density separation.

Flake is next screen-washed to remove pulped paper labels. Washing takes place in a continuous flow with up to six chambers. Washing chambers can use different water temperatures depending on the type of adhesive on the labels. Ambient water is used to wash HDPE milk jug flake, which has labels attached with cold-temperature glue. Hot water is used to remove glue from PET flake. Rinsing is also multistage; flake goes up and down through a series of inclined augers. A filtering system for micron-size particles tests water coming off the flake for contamination before the flake goes through a dewatering centrifuge. If too much fiber is left in the water, it plugs the centrifuge. Water testing is also a quality control method to check the cleanliness of the finished flake.

Polysource says clean flake contains less than 10 ppm of inorganic matter, compared with 50-75 ppm for standard recycling processes. Lastly, flake is twice blended before entering an Instamelt extruder from Permian Research Corp., Big Spring, Texas. The extruder is fitted with a continuous screen filter from Key Filters Inc., Webster, Mass., and goes to an underwater pelletizer.

#### SEPARATE GRINDING AND WASHING

APR's continuous-washing system cleans its PET flake, but APR doesn't pelletize. Privately held, APR started up a 24-million-lb/yr PET recycling plant in March 1992.

What's different about this system is that sorting and grinding are separate from washing. This makes APR's system very efficient in terms of labor. Where Polysource's two wash lines each need two operators for routine maintenance like sharpening grinder blades, only one operator runs the APR wash line. He watches computer screens, records processing data, and tips gaylords of dirty flake into the system with a forklift. A large schematic chart of material flow is illuminated on a control panel, so that the operator can see it from the forklift. If anything goes wrong, like flow rates go out of spec, lights flash. If something is seriously out of spec, e.g., if a pump stops working, an alarm sounds and the computer shuts the system off upstream of the faulty pump to prevent overflow.

At APR, five people per shift work on sorting and grinding bottles. Sorting is done in two eight-hour shifts/day. Bottles are hand-sorted,

granulated on three Cumberland granulators, and aspirated with a vacuum fan to remove liberated labels and fines (about 6% by weight) .

APR has no automated PVC detection device, but controls PVC contamination by monitoring flake quality. Each gaylord of flake is checked by testing four core samples after granulation and again after washing. If flake is contaminated, it will be priced lower. APR says it meets **customer** contamination tolerances of 0-100 ppm of PVC.

APR's wash system is a continuous flow design with lots of chambers. "It takes 10-12 steps to get flake clean," says a company spokesman. Cleaning solutions used in the wash chambers are reused. Different concentrations of washing solution are used in different chambers, and reversible augers can increase residence time, depending on how dirty the flake is. A closed system not only conserves the washing solvent, but also avoids the issue of having to treat effluent, because there isn't any.

After multiple washing stages, flake is rinsed a second time. The only water leaving the system is the final rinse water, which pumps about 20 gal/min of fresh water over the flake. Flake is conveyed to a sink/float separation tank, which is also a closed system. The denser PET is then conveyed through two dryers, first an off-the-shelf spin dryer and then a custom-built, hotair hopper dryer. Lastly, aluminum is removed with a commercial aluminum separator.

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